Journal of Dental Sciences and Education

Original Article

DOI: 10.51271/JDSE-0008

Comparison of aesthetic perceptions created by the factors affecting smile design in different occupational groups

Dilan Ayluçturhan Ayçiçek[1], Elif Pınar Bakır[2]

[1]Oral and Dental Health Center, Diyarbakır, Turkey
[2]Department of Restorative Dentistry, Faculty of Dentistry, Dicle University, Diyarbakır, Turkey

Cite this article: Ayluçturhan Ayçiçek D, Bakır EP. Comparison of aesthetic perceptions created by the factors affecting smile design in different occupational groups. *J Dent Sci Educ*. 2023;1(2):34-40.

Corresponding Author: Dilan Ayluçtarhan Ayçiçek, dr.baycicek@gmail.com

Received: 07/06/2023 ◆ **Accepted**: 25/06/2023 ◆ **Published**: 28/06/2023

ABSTRACT

Aims: This study aimed to compare the effects of factors affecting smile design on aesthetic perceptions in different occupational groups.

Methods: For this study, a questionnaire form was prepared including 42 modified photographs obtained by incorporating different levels of changes in the factors affecting smile design such as gingival visibility, incisal embrasure, buccal corridor, incisor visibility, midline, smile line, vermilion height of the lips, golden ratio, and diastema within a photograph of a woman and a photograph of a man. Voluntary participants were asked to evaluate each photograph in terms of aesthetics and mark the most appealing options on VAS and Likert-type scales.

Results: Fine arts faculty graduates reactedto the differences in the images more positively than the other participants. Restorative dentistry specialists gave higher scores to the smile criteria most liked by all participants compared to other participants, while the criteria that were least liked by all participants received the lowest scores in this group. They gave answers in parallel with the values accepted as ideal. Male and female models were found to be more aestheticwhen golden ratio, incisal embrasures and the midline were not changed, the gingiva covered the central teeth by 1 mm, the lip vermilion height was increased by 2 mm, the line drawn from the incisors of the maxillary anterior was parallel to the lower lip's curvature, the visibility of the central incisorswas 3 mm, and no diastema.

Conclusion: We determined that profession and education do not always have the same effects on aesthetic perceptions. We suggest that the most appropriate results can be achieved in terms of diagnosis and treatment in aesthetic dentistry when the personal tastes of individuals are supported by data from the relevant literature.

Keywords: Aesthetic dentistry, smile, smile design

INTRODUCTION

Demands and expectations for aesthetic dentistry have changed in recent years as individuals have become more visible on social media, and the need for knowledge and experience in dentofacial aesthetics inspired by beautiful faces and smiles and smile aesthetics has increased.[1-5] In order for treatment results to be satisfactory, the criteria for smiles should be considered in more detail in the planning process.[6] In smile analysis, the amount of the visible teeth and gingiva in the smile, the smile arc, tooth ratios, gingival height and contour, the relationship between the tooth midline and the midline of the face, the relationship of the occlusal plane with the interpupillary and commissural line, and the shape and color of the teeth should all be evaluated.[7] In order to determine all of the criteria and factors affecting these outcomes, all details of the teeth should be investigated and carefully evaluated.[8] To ensure that treatmentsprovide ideal aesthetic results, some clinical guidelines should be taken into account. However, the fact that aesthetics is a subjective concept makes it necessary to question these reference parameters according to individual tastes and cultural differences.[9] In the literature, it is observed that different criteria such as the golden ratio, buccal corridor, smile arc, gingival visibility, incisal embrasure, visibility of incisors, vermilion height of the lips, midline, and diastema are considered in different combinations and the perceptions of different occupational groups have been evaluated.[10-14]

This study aimed to examine perceptions of changing aesthetic parameters among different occupational groups using a visual analogue scale (VAS) and a Likert-type scale to determine the ideal values of smile criteria for smile design. The hypothesis of the study was that there would be differences in aesthetic perceptions among occupational groups.

This work is licensed under a Creative Commons Attribution 4.0 International License.

METHODS

Ethics committee approval for the study was obtained from the Ethics Committee of the Dicle University Faculty of Dentistry (Date: ..... , Decision No: .....). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. A total of 315 people, including fifth-year dentistry students, general dentists, restorative dentistry specialists, orthodontists, dental prosthesis laboratory technicians, graduates of the faculty of fine arts, and non-dentists, were divided into seven groups according to their professions. Photographs of a male and female model who signed consent forms were used as the reference photos. The reference photographswere created with right and left buccal corridor widths of 2%, upper central incisor visibilityof 4mm and gingival visibility of -1 mm for the upper central incisors (i.e., gingival margins of the upper central incisors covered by the upper lip line), overlapping facial midline and dental midline, and smile arc parallel to the lower lip curve. Nine smile components were modified using the Adobe Photoshop CC 2014 program within the original reference photos and 33 modified smile photos were created. The changed smile components included the golden ratio, buccal corridor, gingival visibility, lip vermilion height, smile arc, incisal embrasures, incisor visibility, dental midline, and diastema.

Figure 1. Reference photos for maleReference photos for female

The modified photos were created as follows:

- Golden ratio or less than or greater than 60% (**Figure 2**),
- Buccal corridor width 10%, 15%, 22%, 28% (**Figure 3**),
- Visibility of the gingival created via gradually increasing by 1 mm over the reference photographs (**Figure 4**),
- Height of the lip vermilioncreated via gradually increasing the intervals by 0.5 mm over the reference photographs (**Figure 5**),
- Smile arc created straight and reservedin the reference photographs (**Figure 6**),
- Incisal embrasure of ideal size, enlarged, equal, reducedand without embrasure based on the reference photographs (**Figure 7**),
- Central visibility created via gradually decreasing and increasing by 0.5 mm over the reference photographs (**Figure 8**),
- The midline created by gradually shifted to the left at 0.5 mm intervals over the reference photographs (**Figure 9**),
- The diastema created via gradually increased by 0.5 mm intervals over the reference photographs (**Figure 10**).

Separate VAS and Likert-type scales were added to a questionnaire formfor each photograph. The VAS consisted of a ruler with labels ranging from 0 to 10 while the five-point Likert-type scale consisted of a linear sequence ranging from Very Ugly to Ugly, Undecided (Neutral), Beautiful, and Very Beautiful. Voluntary participants were asked to evaluate each photograph aesthetically and mark the most appealing options for them according to the VAS and Likert-type scales.

Figure 2. Male model, Golden ratio 60%, golden ratio greater than 60%, golden ratio less than 60%

Figure 3. Male model, buccal corridor 2%, buccal corridor 28%

Figure 4. Male model, gingival visibility -1 mm, gingival visibility 3 mm

Figure 5. Male model, height of the lip vermilion0, height of the lip vermilion 2 mm

Figure 6. Male model, smile arcparallel, smile arc straight, smile arc reverse

Figure 7. Male model, incisal embrasure ideal, enlarged, equal, reduced, absent

Figure 8. Male model, central visibility 3 mm, Central visibility 5 mm

Figure 9. Male model, midline not shifted, midline shifted 2.5 mm to the left

Figure 10. Male model, diastema not formed, diastema formed 2 mm

Statistical Analysis

The data obtained in this study were analyzed using the IBM spss 21 package program. Data were analyzed using Shapiro Wilk's, two-way ANOVA, Kruskal Wallis-H tests and post-hoc multiple comparison test.

RESULTS

Fine arts faculty graduates reacted to the differences in the images more positively than the other participants. Restorative dentistry specialists gave higher scores to the smile criteria most liked by all participants compared to other participants, while the criteria that were least liked by all participants received the lowest scores in this group. They gave answers in parallel with the values accepted as ideal.

Male and female models were found to be more aesthetic when the golden ratio, incisal embrasures and the midline were not changed, the gingiva covered the central teeth by 1 mm, the lip vermilion height was increased by 2 mm, the line drawn from the incisors of the maxillary anterior was parallel to the lower lip's curvature, the visibility of the central incisors was 3 mm, and no diastema.

In all professional groups, images with a golden ratio of less than 60%, a buccal corridor width of 28%, a central visibility of 5 mm, and a gingival visibility of 3 mm were the least liked.It was determined that the photographs in which the height of the lip vermilion was not changed, the smile arch was reversed, the incisal embrasures were absent or reduced-enlarged, the midline was shifted 2.5 mm to the left, and the diastema was formed were not liked by any professional group. There was strong agreement between the ratings on VAS and the Likert scale.

Table 1. Results related to the golden ratio, buccal corridor, and gingival visibility in the Likert scale for evaluating photographs of male models.

	Meslek													Analiz Sonucu
	Restoratif Diş Tedavisi Uzmanı		Genel Diş Hekimi		Ortodonti Uzmanı		Diş Hekimliği 5. Sınıf Öğrencisi		Diş Protez Laboratuvar Teknisyeni		Güzel Sanatlar Fakültesi Mezunu		Diş Hekimi Olmayan Bireyler	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	p
Altın Oran %60	3,76	0,61	3,62	0,58	3,4	0,58	3,53	0,69	3,6	0,69	3,53	0,79	3,58	0,66	0,336
Altın Oran %60'dan Büyük	2,69	0,9	3,04	0,93	2,76	0,88	2,82	0,65	2,71	1,04	3,42	0,97	2,8	0,81	0,001*
Altın Oran %60'dan Küçük	2,73	0,84	2,51	0,82	2,69	0,79	2,29	0,82	2,51	1,01	3,29	0,89	2,64	0,98	0,001*
Bukkal Koridor %2	4,16	0,74	3,67	0,71	3,89	0,53	3,76	0,57	3,78	0,64	3,76	0,53	3,64	0,68	0,01*
Bukkal Koridor %15	2,38	0,61	2,38	0,61	2,36	0,48	2	0,64	2,27	0,84	2,6	0,78	2,42	0,69	0,01*
Bukkal Koridor %22	1,76	0,65	1,98	0,69	1,49	0,51	1,76	0,8	2,13	0,79	2,38	0,68	2,2	0,59	0,001*
Bukkal Koridor %10	3,62	0,58	3,4	0,62	3,62	0,49	3,36	0,57	3,62	0,78	3,62	0,71	3,56	0,81	0,143
Bukkal Koridor %28	1,47	0,5	1,6	0,62	1,38	0,49	1,64	0,71	1,91	0,7	1,91	0,7	1,91	0,7	0,001*
Diş eti görünürlüğü 1 mm	2,69	0,6	3,62	0,58	3,4	0,58	3,51	0,69	3,6	0,69	3,55	0,79	3,53	0,66	0,336
Diş eti görünürlüğü 3 mm	1,62	0,5	2,07	0,65	2,07	0,72	2,07	0,65	1,98	0,69	2,44	0,76	2,24	0,68	0,028*
Diş eti görünürlüğü 0	3,58	0,62	3,33	0,67	3,27	0,69	3,4	0,54	3,53	0,73	3,87	0,69	3,4	0,78	0,001*
Diş eti görünürlüğü 2 mm	2,07	0,49	3,04	0,93	2,76	0,88	2,82	0,65	2,69	1,04	3,42	0,97	2,8	0,81	0,001*
Diş eti görünürlüğü -1 mm	3,78	0,52	3,4	0,72	3,47	0,73	3,53	0,69	3,42	0,89	3,98	0,78	3,56	0,59	0,002*

Table 2. Results related to the height of the lip vermilion, the smile arch and incisal embrasures in the Likert scale for evaluating photographs of male models.

	Meslek													Analiz Sonucu
	Restoratif Diş Tedavisi Uzmanı		Genel Diş Hekimi		Ortodonti Uzmanı		Diş Hekimliği 5. Sınıf Öğrencisi		Diş Protez Laboratuvar Teknisyeni		Güzel Sanatlar Fakültesi Mezunu		Diş Hekimi Olmayan Bireyler	
	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	Mean	Sd	p
Dudak V.Y 0,5 mm	3,16	0,67	3	0,77	2,71	0,59	2,73	0,81	3,16	0,77	3,31	0,7	2,96	0,93	0,001*
Dudak V.Y 1,5 mm	3,58	0,58	3,27	0,89	3,49	0,51	3,44	0,78	3,27	0,89	3,49	0,94	3,29	1,01	0,512
Dudak V.Y 0 Likert	2,91	0,79	2,82	0,81	2,44	0,59	2,47	0,81	2,62	0,81	3,16	0,98	2,82	0,81	0,001*
Dudak V.Y 1 mm	3,24	0,61	3,24	0,71	3,29	0,51	3,04	0,71	3,13	0,79	3,56	0,89	2,78	0,82	0,001*
Dudak V.Y 2 mm	3,76	0,61	3,51	0,73	3,76	0,43	3,69	0,63	3,27	0,94	3,5	1,01	3,33	0,93	0,009*
Gülümseme Arkı Düz	3,2	0,79	3,21	0,91	3,16	0,67	3,04	1,09	3,18	1,03	3,53	0,94	3,13	0,69	0,239
Gülümseme Arkı Ters	2,67	0,88	2,73	1,03	2,89	0,78	2,8	1,1	2,53	1,06	2,96	0,93	2,67	0,85	0,258
Gülümseme Arkı Paralel	3,49	0,79	3,22	0,93	3,56	0,62	2,73	1,03	3,47	0,89	3,82	0,75	3,42	0,87	0,001*
İnsizal Embrasür Eşit	2,67	0,56	3,16	0,74	3,44	0,89	2,91	0,97	2,8	0,89	3,27	0,65	3,02	1,06	0,001*
İnsizal Embrasür İdeal	3,98	0,5	3,6	0,62	3,8	0,5	3,69	0,67	3,49	0,97	3,82	0,81	3,47	0,81	0,014*
İnsizal Embrasür Azalmış	2,38	0,61	2,42	1,03	2,64	0,83	2,33	0,88	1,78	1	2,6	1,12	2,53	1,14	0,001*
İnsizal Embrasür Yok	2,36	0,61	2,67	0,95	2,33	0,6	2,4	0,84	2,07	1,1	2,53	1,31	2,11	1,15	0,036*
İnsizal Embrasür Artmış	2,67	0,52	2,89	0,71	2,69	0,56	2,71	0,79	2,78	0,9	3,02	0,97	2,84	0,9	0,578

Table 3. Results related to the central visibility, midline and diastemain the Likert scale for evaluating photographs of male models.

	Meslek														Analiz Sonucu
	Restoratif Diş Tedavisi Uzmanı		Genel Diş Hekimi		Ortodonti Uzmanı		Diş Hekimliği 5. Sınıf Öğrencisi		Diş Protez Laboratuvar Teknisyeni		Güzel Sanatlar Fakültesi Mezunu		Diş Hekimi Olmayan Bireyler		
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	p
Keserlerin Görünürlüğü 3,5 mm	3,69	0,6	3,51	0,84	3,44	0,55	3,27	0,78	3,36	0,93	3,51	0,82	3,27	0,86	0,175
Keserlerin Görünürlüğü 4,5 mm	2,47	0,66	2,58	0,84	2,18	0,81	2,31	0,82	2,33	0,67	2,91	0,95	2,69	1,08	0,002*
Keserlerin Görünürlüğü 3 mm	3,78	0,6	3,67	0,71	3,69	0,56	3,38	0,75	3,56	0,89	3,67	0,93	3,38	0,86	0,085
Keserlerin Görünürlüğü 4 mm	2,84	0,64	2,96	0,93	2,47	0,92	2,69	1,02	3	0,48	3,09	1	2,82	0,98	0,015*
Keserlerin Görünürlüğü 5 mm	1,44	0,5	1,73	0,72	1,24	0,57	1,62	0,65	1,36	0,48	2,11	1,23	1,78	0,93	0,001*
Orta Hat 0	3,67	0,74	3,42	0,69	3,71	0,46	3,4	0,84	3,27	0,96	3,64	0,91	3,38	0,83	0,089
Orta Hat 2 mm Sola Kayma	2	1,09	2,38	0,68	2,22	0,6	2,16	0,82	2,29	1,1	2,78	1,18	2,2	0,5	0,012*
Orta Hat 0,5mm Sola Kayma	3,42	0,62	2,71	0,84	3,36	0,57	2,78	0,93	2,76	0,77	3,04	0,8	2,87	0,81	0,001*
Orta Hat 1,5 mm Sola Kayma	2,2	0,84	2,67	0,93	2,76	1	2,58	1,12	2,49	0,73	2,98	0,81	2,67	1,04	0,005*
Orta Hat 2,5 mm Sola Kayma	1,89	0,53	2,36	0,8	2,02	0,62	2	0,8	2,04	1,13	2,38	1,07	2,11	1,11	0,088
Orta Hat 1 mm Sola Kayma	2,89	0,61	2,89	0,78	3,07	0,69	2,84	1,04	2,76	0,98	3,16	1	2,89	0,91	0,38
Diastema 0,5mm	2,47	0,76	2,4	0,91	2,38	0,83	2,24	1,07	2,47	1,12	2,73	0,89	2,33	0,9	0,226
Diastema 1,5mm	1,6	0,69	1,62	0,65	1,49	0,55	1,49	0,63	1,38	0,65	1,73	0,65	1,64	0,8	0,132
Diastema Yok	3,91	0,67	3,31	0,73	3,64	0,65	3,44	0,69	3,44	1,01	3,76	0,68	3,2	0,84	0,001*
Diastema 1mm	1,96	0,52	1,91	0,7	1,69	0,6	1,69	0,63	1,98	0,78	2,09	0,73	2,02	0,78	0,039*
Diastema 2mm	1,27	0,45	1,33	0,48	1,29	0,51	1,16	0,37	1,24	0,53	1,44	0,69	1,38	0,61	0,332

Table 4. Results related to the golden ratio, buccal corridor, and gingival visibility in the VAS scale for evaluating photographs of female models

	Meslek														Analiz Sonucu
	Restoratif Diş Tedavisi Uzmanı		Genel Diş Hekimi		Ortodonti Uzmanı		Diş Hekimliği 5. Sınıf Öğrencisi		Diş Protez Laboratuvar Teknisyeni		Güzel Sanatlar Fakültesi Mezunu		Diş Hekimi Olmayan Bireyler		
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	p
Altın Oran %60	6,42	2,44	5,51	2,28	6,29	1,88	5	2,61	5,02	2,85	4,82	2,68	5,07	2,48	0,008*
Altın Oran %60'dan Büyük	4,07	2,43	4,11	2,29	4,73	2,6	3,84	2,55	3,62	2,66	4,80	3,05	3,6	2,61	0,003*
Altın Oran %60'dan Küçük	2,11	1,47	2,49	1,98	2,51	1,98	1,87	2,12	2,2	2,35	3,13	2,42	2,36	2,56	0,106
Bukkal Koridor %2	5,71	2,25	5,36	1,98	6,38	1,83	6,04	2,53	5,02	2,8	5,70	2,69	5,29	2,73	0,175
Bukkal Koridor %15	2,42	1,64	2,73	1,86	2,11	1,47	2,42	2,21	2,44	2,36	2,78	2,34	2,98	2,9	0,822
Bukkal Koridor %22	6,98	1,51	6,33	1,76	6,98	1,51	6,31	2,22	5,91	2,65	5,71	2,8	5,73	2,47	0,085
Bukkal Koridor %10	3,69	1,78	3,89	1,54	3,93	1,45	3,8	1,82	3,56	2,38	3,62	2,46	3,42	2,29	0,586
Bukkal Koridor %28	0,8	1,29	1,6	1,76	0,98	1,31	1,29	1,84	1,98	2,45	1,67	2,27	1,98	2,05	0,03*
Diş eti Görünürlüğü 0	6,51	1,71	5,22	2,37	6,07	2,04	4,89	2,87	5,02	2,78	4,71	2,7	5,33	2,83	0,012*
Diş eti Görünürlüğü -1 mm	6,67	2,15	4,87	2,61	6,6	1,88	5,22	2,54	5,87	2,73	5,82	2,74	5,8	2,63	0,007*
Diş eti Görünürlüğü 1 mm	2,8	1,58	2,96	2	2,64	1,84	2,8	1,96	3,31	2,39	3,67	2,14	3,84	2,32	0,078
Diş eti Görünürlüğü 3 mm	0,87	1,16	1,4	1,37	0,71	0,97	0,84	1,3	1,11	1,86	1,27	1,94	1,38	1,5	0,095
Diş eti Görünürlüğü 2 mm	2,27	1,79	2,04	1,62	1,71	1,24	2,04	1,93	1,8	2,06	2,56	1,84	2,84	2,15	0,031*

Table 5. Results related to the height of the lip vermilion, the smile arch and incisal embrasures in the VAS scale for evaluating photographs of female models.

	Meslek														Analiz Sonucu
	Restoratif Diş Tedavisi Uzmanı		Genel Diş Hekimi		Ortodonti Uzmanı		Diş Hekimliği 5. Sınıf Öğrencisi		Diş Protez Laboratuvar Teknisyeni		Güzel Sanatlar Fakültesi Mezunu		Diş Hekimi Olmayan Bireyler		
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	p
Dudak V Y 0,5 mm	5,29	2,83	5,4	2,36	5,44	2,99	3,53	2,69	4,91	2,53	5,8	2,41	4,18	2,73	0,001*
Dudak V Y 1,5 mm	5,91	2,4	5,11	2,06	5,73	2,96	4,27	2,96	5,51	2,74	5,71	2,59	5,04	2,65	0,069
Dudak V Y 0	4,69	2,51	5,24	2,05	4,89	2,72	4,27	2,82	4,91	2,61	5,96	2,37	4,33	2,76	0,037*
Dudak V Y 1 mm	5,42	2,37	5,41	2,25	5,16	2,32	4,4	2,96	5,42	2,44	6,18	2,11	5,64	2,44	0,122
Dudak V Y 2 mm	6,2	2,38	5,44	2,38	4,58	2,79	4,51	2,78	5,93	2,52	6,11	2,79	6,04	2,44	0,001*
Gülümseme Arkı Düz	5,38	2,89	5,4	1,88	5,8	1,85	4,44	2,87	5,82	2,49	5,38	2,59	5,09	2,74	0,277
Gülümseme Arkı Ters	2,56	2,02	3,16	2,04	3,27	2,29	2,56	2,3	2,42	2,05	2,42	1,95	2,62	1,98	0,241
Gülümseme Arkı Paralel	6,96	1,73	5,41	2,06	5,82	2,26	6,33	2,08	6	2,62	6,27	2,47	4,71	2,77	0,001*
İnsizal Embrasür Artmış	4,13	2,33	4,47	2,33	5,11	2,14	3,82	2,36	3,13	2,28	3,4	2,15	2,8	2,25	0,001*
İnsizal Embrasür Eşit	5,02	2,48	5,2	2,06	5,47	2,26	3,98	2,96	4	2,58	5,2	2,55	3,93	2,2	0,002*
İnsizal Embrasür İdeal	6,96	2,28	6,2	1,74	6,91	1,56	5,84	2,63	6,24	2,37	6,91	1,53	6,16	2,26	0,102
İnsizal Embrasür Azalmış	3,73	2,38	3,89	2,52	4,07	2,26	3,53	2,69	3	2,35	3,64	2,59	3,78	2,44	0,354
İnsizal Embrasür Yok	3,93	2,29	4,87	2,02	5,18	2,45	3,93	2,52	3,73	2,32	4,31	2,63	3,69	2,28	0,014*

Table 6. Results related to the central visibility, midline and diastemain the VAS scale for evaluating photographs of female models.

	Meslek														Analiz Sonucu
	Restoratif Diş Tedavisi Uzmanı		Genel Diş Hekimi		Ortodonti Uzmanı		Diş Hekimliği 5. Sınıf Öğrencisi		Diş Protez Laboratuvar Teknisyeni		Güzel Sanatlar Fakültesi Mezunu		Diş Hekimi Olmayan Bireyler		
	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	Mean	Std	p
Keserlerin Görünürlüğü 3,5 mm	6,33	1,72	5,53	2,15	6,31	1,58	5,02	2,55	6,31	2,19	6,09	2,42	5,8	2,25	0,218
Keserlerin Görünürlüğü 4,5 mm	2,98	1,82	3,62	1,93	3,38	1,89	3,47	2,15	3,56	2,14	3,62	2,04	3,42	2,01	0,748
Keserlerin Görünürlüğü 3 mm	6,89	1,61	5,8	2,25	6,78	1,81	5,2	2,57	6,49	1,89	5,82	2,18	6,2	1,85	0,002*
Keserlerin Görünürlüğü 4 mm	4,38	1,79	5,29	2,14	4,64	1,63	4,58	2,68	5,02	2,32	5,07	2,07	5,09	2,11	0,358
Keserlerin Görünürlüğü 5 mm	1	1,43	1,96	2,06	1,93	1,56	1,71	2,01	1,42	1,23	1,8	2,16	2,06	1,97	0,083
Orta Hat 0	7,36	1,42	5,67	2,45	6,64	1,93	5,38	2,63	6,58	2,21	6,8	2,03	5,96	2,03	0,001*
Orta Hat 1 mm Sola Kayma	3,29	2	3,91	2,25	4,56	2,7	3,56	2,6	3,47	2,4	4,8	2,06	4,53	2,61	0,007*
Orta Hat 2 mm Sola Kayma	2,22	1,49	3,2	1,82	2,64	1,64	2,51	2,15	2,44	1,95	3,8	2,03	3,04	1,91	0,001*
Orta Hat 0,5 mm Sola Kayma	6,07	1,45	4,82	2,29	5,91	1,84	4,53	2,89	5,4	2,14	4,98	2,49	4,78	2,09	0,008*
Orta Hat 1,5 mm Sola Kayma	3,02	1,73	3,64	2,06	3,09	1,74	2,67	2,17	2,44	1,52	3,16	2,27	3,73	2,14	0,025*
Orta Hat 2,5 mm Sola Kayma	1,62	1,85	2,67	2,17	1,42	1,7	1,47	1,69	2,38	2,08	2,78	2,27	3,16	2,04	0,001*
Diastema 0,5 mm	5,58	2,45	4,38	2	5,53	1,47	4,13	2,84	4,29	1,98	5,02	2,32	4,02	2,23	0,001*
Diastema 1,5 mm	2,47	1,6	2,44	1,84	1,87	1,27	2,16	2,12	2,38	1,98	2,58	1,8	2,07	1,5	0,466
Diastema Yok	7,11	1,68	5,56	2,59	6,71	1,58	5,36	2,58	6,11	2,6	6,44	2,3	5,87	2,18	0,009*
Diastema 1 mm	1,62	0,98	1,4	1,37	1,2	0,99	1,29	1,95	1,27	1,4	1,44	1,36	1,27	1,4	0,254
Diastema 2 mm	0,38	0,98	0,87	1,16	0,71	0,97	0,67	1,41	0,49	0,87	0,93	1,01	0,82	1,64	0,046*

Table 7. Correlation results of the relationship between VAS and the Likert scale in female model photographs(The p value is 0.001 and the n value is 315).

	r value (p= 0.001 n=315)
Golden ratio 60%	0.890**
Golden ratio <60%	0.887**
Golden ratio >60%	0.814**
Buccal corridor 2%	0.865**
Buccal corridor 10%	0.857**
Buccal corridor 15%	0.868**
Buccal corridor 22%	0.872**
Buccal corridor 28%	0.905**
Gingival visibility -1 mm	0.904**
Gingival visibility 0	0.832**
Gingival visibility 1 mm	0.804**
Gingival visibility 2 mm	0.862**
Gingival visibility 3 mm	0.828**
Lip vermillion height 0	0.844**
Lip vermillion height 0.5 mm	0.873**
Lip vermillion height 1 mm	0.807**
Lip vermillion height 1.5 mm	0.861**
Lip vermillion height 2 mm	0.896**
Smile arc straight	0.841**
Smile arc reverse	0.833**
Smile arc parallel	0.841**
Incisal embrasure enlarged	0.831**
Incisal embrasure equal	0.840**
Incisal embrasure ideal	0.861**
Incisal embrasure reduced	0.865**
No incisal embrasure	0.856**
Central visibility 3 mm	0.848**
Central visibility 3.5 mm	0.845**
Central visibility 4 mm	0.815**
Central visibility 4.5 mm	0.862**
Central visibility 5 mm	0.870**
Midline 0	0.847**
Midline 0.5 mm	0.837**
Midline 1 mm	0.877**
Midline 1.5 mm	0.846**
Midline 2 mm	0.870**
Midline 2.5 mm	0.915**
No diastema	0.869**
Diastema 0.5 mm	0.833**
Diastema 1 mm	0.810**
Diastema 1.5 mm	0.884**
Diastema 2 mm	0.827**

DISCUSSION

Aesthetic perceptions have changed in recent years as individuals have become more visible on social media and the demand for smile design has increased. This, in turn,has increased the need for knowledge and experience in the field of smile aesthetics. In order to increase the success in diagnosis and treatment, criteria such as the golden ratio and buccal corridor, smile arc, gingival visibility, incisal embrasure, visibility of the incisors, vermilion height of the lips, midline, and diastema must be considered. However, it is also of critical importance to consider individual tastes and differences in cultural aesthetic perceptions with various scales to guide the process of treatment planning.

Since VAS and Likert-type scales are accurate, reliable, and reproducible methods for the subjective measurement of pain, they have been used in many studies evaluating the factors affecting smile design.[15-18] In the present study, it was aimed to use such scales to determine the consistency levels among participants' aesthetic preferences by evaluating the correlations between the scales.

The importance of smile aesthetics in recent years has necessitated the need for physicians to pay more attention to generally accepted criteria in diagnosis and treatment planning. Sadrhaghighi et al.[19] evaluated effects on smile aesthetics by changing the golden ratio of the lateral incisors in their study. The difference in our study compared to the study of Sadrhaghighi et al.[19] lies in the evaluation of the effects on smile aesthetics of changing the golden ratio of the central incisor teeth along with the lateral incisors. In a study by Amuasi et al.[20] in which the presence of the golden ratio was investigated in terms of the width of the upper anterior teeth, it was suggested that the value obtained was different from the accepted golden ratio value and the golden ratio rule should definitely not be applied in restoring the anterior teeth of patients. Contrary to that study, we concluded that the golden ratio is a criterion that should be evaluated while designing a smile.

Oshagh et al.[21] created different sizes of buccal corridor width as 2% (wide), 10% (medium-wide), 15% (medium), 22% (medium-narrow) and 28% (narrow) and evaluated their effect on smile aesthetics.Participants preferred wider buccal corridors for the male model and narrower buccal corridors for the female model. The 28% buccal corridor width for both genders was not liked by our participants. In our study, photographs containing buccal corridors of five different sizes were created, and, in line with the findings of Oshagh et al.[21] we concluded that wider buccal corridors for the male model and narrower buccal corridors for the female model were more appreciated by our participants. When the buccal corridor width was 28% for both the male and female models, it was deemed less aesthetically pleasing.

Roden-Johnson et al.[22] and Ritter et al.[23] evaluated the effects of buccal corridors on smile aesthetics and concluded that buccal corridors had no effects on aesthetics. Contrary to those studies, we concluded that buccal corridors have an effect on aesthetics.

In a study conducted by Sybaite et al.[24] the effect of different amounts of gingival visibility (-6, -3, 0, 3, 6 mm) on smile aesthetics was investigated.Gingival visibility of 0 mm was aesthetically pleasing for all participants, while gingival visibility of 6 mm was not liked by any occupational groups. In a study by Maniyar et al.[25] gingival visibility was changed as -3, -1, 0, 1, 3.5 mm, and 0 mm gingival visibility was accepted as more aesthetic by all participants.In our study, five photographs were created with different levels of gingival visibility, including 0 mm, 1 mm, 2 mm, 3 mm, and -1 mm (i.e., the gingival margins of the upper central incisors being covered by the upper lip line). As a result, gingival visibility of -1 mm was evaluated as being most aesthetic by all participants for both the male and female models, followed by gingival visibility of 0 mm. Gingival visibility of 3 mm for the male and female models was not appreciated by any participants.

In a study by Ioi et al.[26] the upper and lower vermilion heights were varied by increasing or decreasing the vermilion height from -3 mm to 3 mm with 1-mm increments with reference to the average vermilion height. In our study, both the upper and lower vermilion heights were gradually increased in line with previous studies.[17] Rahmati Kamel et al.[27] evaluated the vermilion height of the upper lip on a main photo and three photos with variations of ±2 mm, and

they suggested that lips have a significant effect on smile aesthetics. In their study, the photo with the upper lip's vermilion height reduced by 2 mm was considered as the most aesthetic smile among all groups, while the photo with the upper lip's vermilion height increased by 2 mm was not liked by the participants. In our study, the photograph in which the upper lip's vermilion height was increased by 2 mm for the male and female models was evaluated as being more aesthetic by all participants, while the photographs in which the vermilion height was not changed were not liked by any occupational groups.

In a study by Shabbir et al.[28] in which the effects of smile arcs (parallel, straight, or exaggerated) and buccal corridors on smile aesthetics were evaluated, it was reported that most participants preferred the parallel smile arc as the ideal. Gaikwad et al.[29] also evaluated the effects of smile arcs on smile aesthetics. Smile arcswere modified to be flat or exaggerated. In their study, the "ideal" smile arc, in which the lower lip touches and parallels the incisal edges of the upper incisors, was the arc most admired by all groups. Consistent with that study, parallel, straight, and reverse smile arcs were created in our study and the most popular arc was found to be the parallel smile arc.

Foulger et al.[30] created five photographs reflecting ideal, equal, diminished, absent, and increased incisal embrasures, and the ideal or equal incisal embrasures were evaluated as being more aesthetic. The absence of incisal embrasures was not appreciated by the participants. In our study, similar to that previous study, five photographs of ideal, equal, decreased, absent, and increased incisal embrasure were used. Our findings are compatible with those of Foulger et al. in terms of ideal and equal incisal embrasures being more aesthetic, respectively. In our study, the absence of incisal embrasures and their increased or decreased appearance were evaluated asartificial appearances, and those photographs were liked less by all participants compared to the ideal and equal ones.

Jain et al.[31] evaluated the effect of modifying photographs according to the midline criterion for smile aesthetics using a Likert-type scale. Participating dentists stated that a midline shift did not affect the aesthetics and that shifting was acceptable. Contrary to that study, our findings showed that the midline criterion had an effect on smile aesthetics.

Ousehal et al.[32] evaluated the effect of upper midline deviation on perceptions of smile aesthetics using a VAS. A reference photograph was digitally modified with deviations of 1 mm toward the left side of the patient. Dentists gave significantly lower scores in response to all increased deviations in the maxillary midline compared to non-dentists.

In the study conducted by Talic et al.[33] dentists gave lower scores to midline deviations greater than 1 mm compared to non-dentists. It was concluded that dentists were more sensitive to midline deviations.

As a result of our study, among participants from all occupational groupsaccording to both scales, the reference photographs in which the midline was not changed for the male and female models were selected as the most aesthetic photographs. For the male model, the photographs in which the midline was shifted to the left by 1 mm, 1.5 mm, and 2 mmreceived the lowest scores from restorative dentistry specialists compared to other participants. For the female model, photographs in which the midline was shifted 1 mm and 2 mm to the left received the lowest scores from restorative dentistry specialists. Thus, our findings are similar to those of Talic et al.[33] and Ousehal et al.[32] and we concluded that specialist dentists were more critical of midline deviations than other participants.

Caramello et al.[34] evaluated the effects on smile aesthetics of modifying photographs by increasing the vertical dimensions of the maxillary incisors at intervals of 0.5 mm (0 mm, 0.5 mm, 1 mm, 1.5 mm, 2 mm, and 2.5 mm) using a VAS. In line with the approach of Caramello et al., the visibility of the maxillary incisors was gradually changed at intervals of 0.5 mm in our study.

Ousehal et al.[32] evaluated the effect of crown length on perceptions of smile aesthetics using a VAS. The crown length of the central incisors was shortened to 3 mm at increments of0.5 mm to shorten the crown length from the apex of the gingival margin according to the baseline reference. Dentists were more critical while evaluating crown length differences than non-dentists.

As a result of our study, the photographs in which the visibility of the incisors was 5 mm for the male and female models were not liked by any occupational groups. In accordance with the study of Ousehal et al.[32] we found that specialist dentists were more critical while evaluating the visibility of the incisors compared to other participants. We also observed that as the amount of visibility of the incisors increased, the appreciation of the participants decreased, and it was concluded that the vertical amount of visible maxillary incisors significantly affected perceptions of dentofacial aesthetics.

In the study conducted by Chaves et al.[35] a video image was created using photographs modified by 0.5, 1, and 1.5 mm. As a result, it was determined that the presence of maxillary midline diastema significantly affected perceptions of dentofacial aesthetics. Images without diastema orwith midline diastema of 0.5 mm were liked, while images with diastema of 1 mm or more were not liked.

Taki et al.[36] evaluated the effects of modifying photographs according to smile criteria such as midline diastema, gingival visibility, smile arc, buccal corridor, central incisor length, and lateral incisor width. Four modified diastema photographs of 0.5, 1, 1.5, and 2 mm were created, with 0 mm as the baseline. All three groups of participants aesthetically preferred the control image without midline diastema, followed by midline diastema of 0.5 mm. In our study, similar diastema modifications were used and we obtained similar results as participants preferred no diastema or midline diastema of 0.5 mm. As a result of our study, based on evaluations of photographs of both the male and female models, it was determined that the presence of diastema was the least aesthetically acceptable criterion compared to all other smile criteria and that dentofacial aesthetic criteriasignificantly affect people's perceptions.

CONCLUSION

According to the results of our study, there was strong agreement between the VAS and Likert-type scale evaluations. Furthermore, when all occupational groups were compared, it was found that restorative dentistry specialists were more sensitive in terms of noticing the modifications applied to the photographs, while graduates of faculties of fine arts assessed the these changes more positively than the other participants.

As well as the expectations and wishes of patients who apply to dentistry practitioners for smile design, the practitioners' command of generally accepted criteria such as the golden ratio and their experience with these applications are also important for successful smile aesthetics. We found that profession and education are not always equally effective on aesthetic understandings. Therefore, we conclude that the most appropriate results will be reached in terms of diagnosis and treatment in aesthetic dentistry when the personal tastes of individuals are supported by knowledge gained from the relevant literature.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Dicle University Faculty of Dentistry. Ethics Committee (Date: ……., Decision No: ……).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

Author Contributions: All of the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

REFERENCES

1. Gurel G. The science and art of porcelain laminate veneers. Quintessence, New Malden, Surrey, United Kingdom, 2003.
2. Flores-Mir C, Silva E, Barriga MI, Lagravere MO, Major PW. Lay person's perception of smile aesthetics in dental and facial views. *J Orthod.* 2004;31(3):204-201. doi:10.1179/146531204225022416
3. Beall AE. Can a new smile make you look more intelligent and successful?. *Dent Clin North Am.* 2007;51(2):289-vii. doi:10.1016/j.cden.2007.02.002
4. Abu Alhaija ES, Al-Shamsi NO, Al-Khateeb S. Perceptions of Jordanian laypersons and dental professionals to altered smile aesthetics. *Eur J Orthod.* 2011;33(4):450-456. doi:10.1093/ejo/cjq100
5. Machado AW, Moon W, Gandini LG Jr. Influence of maxillary incisor edge asymmetries on the perception of smile esthetics among orthodontists and laypersons. *Am J Orthod Dentofacial Orthop.* 2013;143(5):658-664. doi:10.1016/j.ajodo.2013.02.013
6. Janson G, Branco NC, Fernandes TM, Sathler R, Garib D, Lauris JR. Influence of orthodontic treatment, midline position, buccal corridor and smile arc on smile attractiveness. *Angle Orthod.* 2011;81(1):153-161. doi:10.2319/040710-195.1
7. Pinho S, Ciriaco C, Faber J, Lenza MA. Impact of dental asymmetries on the perception of smile esthetics. *Am J Orthod Dentofacial Orthop.* 2007;13(6):748–753.
8. Cortellini P, Bissada NF. Mucogingival conditions in the natural dentition: Narrative review, case definitions, and diagnostic considerations. *J Periodontol.* 2018;89 Suppl 1:S204-S213. doi:10.1002/JPER.16-0671
9. Van der Geld P, Oosterveld P, Van Heck G, Kuijpers-Jagtman AM. Smile attractiveness. self-perception and influence on personality. *Angle Orthod.* 2007;77(5):759-765. doi:10.2319/082606-349
10. Ousehal L, Aghoutan H, Chemlali S, Anssari IF, Talic N. Perception of altered smile esthetics among Moroccan professionals and lay people. *Saudi Dent J.* 2016;28(4):174-182. doi:10.1016/j.sdentj.2015.12.004
11. Geevarghese A, Baskaradoss JK, Alsalem M, et al. Perception of general dentists and laypersons towards altered smile aesthetics. *J Orthod Sci.* 2019;8:14. doi:10.4103/jos.JOS_103_18
12. Al-Saleh SA, Al-Shammery DA, Al-Shehri NA, Al-Madi EM. Awareness of dental esthetic standards among dental students and professionals. *Clin Cosmet Investig Dent.* 2019;11:373-382. doi:10.2147/CCIDE.S224400
13. Menezes EBC, Bittencourt MAV, Machado AW. Do different vertical positions of maxillary central incisors influence smile esthetics perception?. *Dental Press J Orthod.* 2017;22(2):95-105. doi:10.1590/2177-6709.22.2.095-105.oar
14. Nomura S, Freitas KMS, Silva PPCD, et al. Evaluation of the attractiveness of different gingival zeniths in smile esthetics. *Dental Press J Orthod.* 2018;23(5):47-57. doi:10.1590/2177-6709.23.5.047-057.oar
15. Alhammadi MS, Halboub E, Al-Mashraqi AA, et al. Perception of facial, dental, and smile esthetics by dental students. *J Esthet Restor Dent.* 2018;30(5):415-426. doi:10.1111/jerd.12405
16. Ayyildiz E, Tan E, Keklik H, Demirtag Z, Celebi AA, Pithon MM. Esthetic impact of gingival plastic surgery from the dentistry students' perspective. *Eur J Dent.* 2016;10(3):397-402. doi:10.4103/1305-7456.184164
17. Al Taki A, Khalesi M, Shagmani M, Yahia I, Al Kaddah F. Perceptions of altered smile esthetics: a comparative evaluation in orthodontists, dentists, and laypersons. *Int J Dent.* 2016;2016:7815274. doi:10.1155/2016/7815274
18. Sridharan S, Samantha C. Comparison of perception of smile by orthodontists and other specialty dentists: a questionnaire study. *Int J Orthod Rehabil.* 2016;7: 92. doi: 10.4103/2349-5243.192530
19. Sadrhaghighi H, Zarghami A, Sadrhaghighi S, Eskandarinezhad M. Esthetic perception of smile components by orthodontists, general dentists, dental students, artists, and laypersons. *J Investig Clin Dent.* 2017;8(4):10.1111/jicd.12235. doi:10.1111/jicd.12235
20. Amuasi AA, Acheampong OA, Owusu S. Evaluation of the golden proportion in patients visiting the oral health directorate of the komfo anokye teaching hospital, Kumasi. *Journal of Biosciences and Medicines* 2020;8:116-126. doi: 10.4236/jbm.2020.88011
21. Oshagh M, Zarif NH, Bahramnia F. Evaluation of the effect of buccal corridor size on smile attractiveness. *Eur J Esthet Dent.* 2010;5(4):370-380.
22. Roden-Johnson D, Gallerano R, English J. The effects of buccal corridor spaces and arch form on smile esthetics. *Am J Orthod Dentofacial Orthop.* 2005;127(3):343-350. doi:10.1016/j.ajodo.2004.02.013
23. Ritter DE, Gandini LG, Pinto Ados S, Locks A. Esthetic influence of negative space in the buccal corridor during smiling. *Angle Orthod.* 2006;76(2):198-203. doi:10.1043/0003-3219(2006)076[0198:EIONSI]2.0.CO;2
24. Sybaite J, Sharma P, Fine P, Blizard R, Leung A. The influence of varying gingival display of maxillary anterior teeth on the perceptions of smile aesthetics. *J Dent.* 2020;103:103504. doi:10.1016/j.jdent.2020.103504
25. Maniyar M, Kalia A, Mirdehghan N. Evaluation of the influence of gingival display on smile esthetics in Indian females-a computer-aided photographic analysis. *J Indian Orthod Soci.* 2018;52: 2. doi:10.4103/jios.jios_116_17
26. Ioi H, Kang S, Shimomura T, et al. Effects of vermilion height on lip esthetics in Japanese and Korean orthodontists and orthodontic patients. *Angle Orthod.* 2014;84(2):239-245. doi:10.2319/041613-293.1
27. RahmatiKamel M, Samadi E. Comparison of the perception of smile esthetics among general dentists and specialist. *J Dentomaxillofac Radiol Pathol Surg.* 2014;3: 2.
28. Shabbir O, Hasan RS, Effect of variations in the smile arc and buccal corridor width on smile esthetics from the perspective of an orthodontist, a general dentist and a lay person. *Pakistan Orthodontic J.* 2019:11(1);9-15.
29. Gaikwad S, Kaur H, Vaz AC, et al. Influence of smile arc and buccal corridors on facial attractiveness: a cross-sectional study. *J Clin Diagn Res.* 2016;10(9):ZC20-ZC23. doi:10.7860/JCDR/2016/19013.8436
30. Foulger TE, Tredwin CJ, Gill DS, Moles DR. The influence of varying maxillary incisal edge embrasure space and interproximal contact area dimensions on perceived smile aesthetics. *Br Dent J.* 2010;209(3):E4. doi:10.1038/sj.bdj.2010.719
31. Jain RK, Dinesh S, Priya A, Kumar MP. Comparison of perception of smile by orthodontists and general dental practitioners-a questionnaire study. *Drug Invention Today.* 2019;12(2):384-387.
32. Ousehal L, Aghoutan H, Chemlali S, Anssari IF, Talic N. Perception of altered smile esthetics among Moroccan professionals and lay people. *Saudi Dent J.* 2016;28(4):174-182. doi:10.1016/j.sdentj.2015.12.004
33. Talic N, Alomar S, Almaidhan A. Perception of Saudi dentists and lay people to altered smile esthetics. *Saudi Dent J.* 2013;25(1):13-21. doi:10.1016/j.sdentj.2012.09.001
34. Caramello F, Bittencourt MAV, Machado AW. Influence of maxillary incisor level of exposure on the perception of dentofacial aesthetics among orthodontists and laypersons. *Am J Orthod and Dentofacial Orthop.* 2015;4(3):108–113. doi: 10.1016/j.ejwf.2015.06.002
35. Chaves PRB, Karam AM, Machado AW. Does the presence of maxillary midline diastema influence the perception of dentofacial esthetics in video analysis?. *Angle Orthod.* 2021;91(1):54-60. doi:10.2319/032020-200.1
36. Al Taki A, Khalesi M, Shagmani M, Yahia I, Al Kaddah F. Perceptions of altered smile esthetics: a comparative evaluation in orthodontists, dentists, and laypersons. *Int J Dent.* 2016;2016:7815274. doi:10.1155/2016/7815274